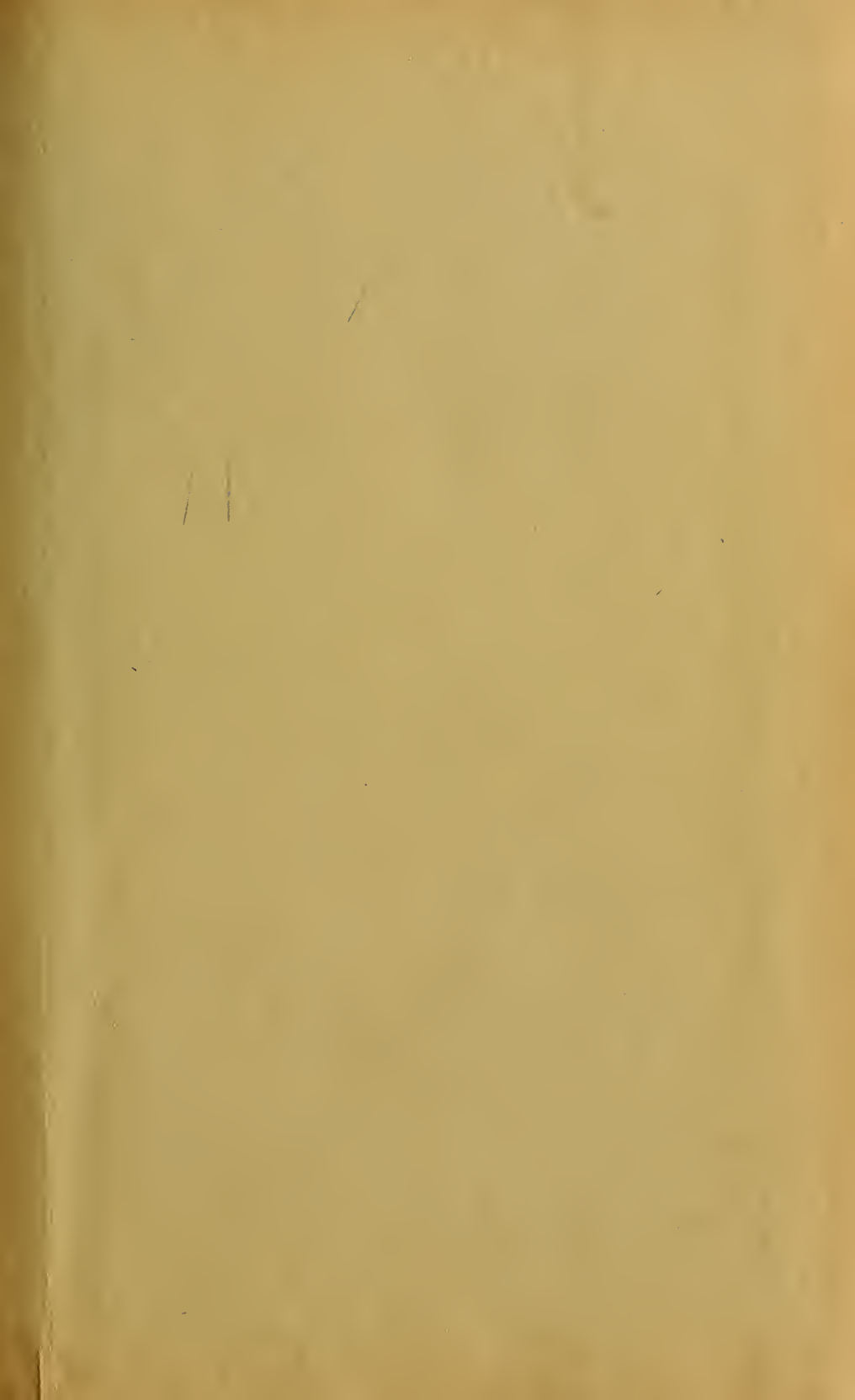
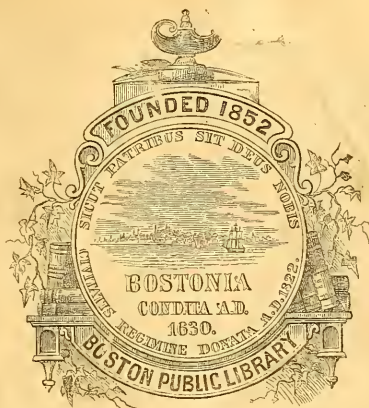


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HUNDRED YEARS'

PROGRESS

OF

AMERICAN AGRICULTURE:

AN ESSAY FROM THE TWENTY-FIRST ANNUAL REPORT OF THE MASSACHUSETTS
STATE BOARD OF AGRICULTURE.

BY

CHARLES L. FLINT,

SECRETARY MASSACHUSETTS STATE BOARD OF AGRICULTURE.

BOSTON:

WRIGHT & POTTER, STATE PRINTERS,

CORNER OF MILK AND FEDERAL STREETS.

1874.

Commonwealth of Massachusetts.



STATE BOARD OF AGRICULTURE,

SECRETARY'S OFFICE,

State House, Boston, *Mar 4* 1875-

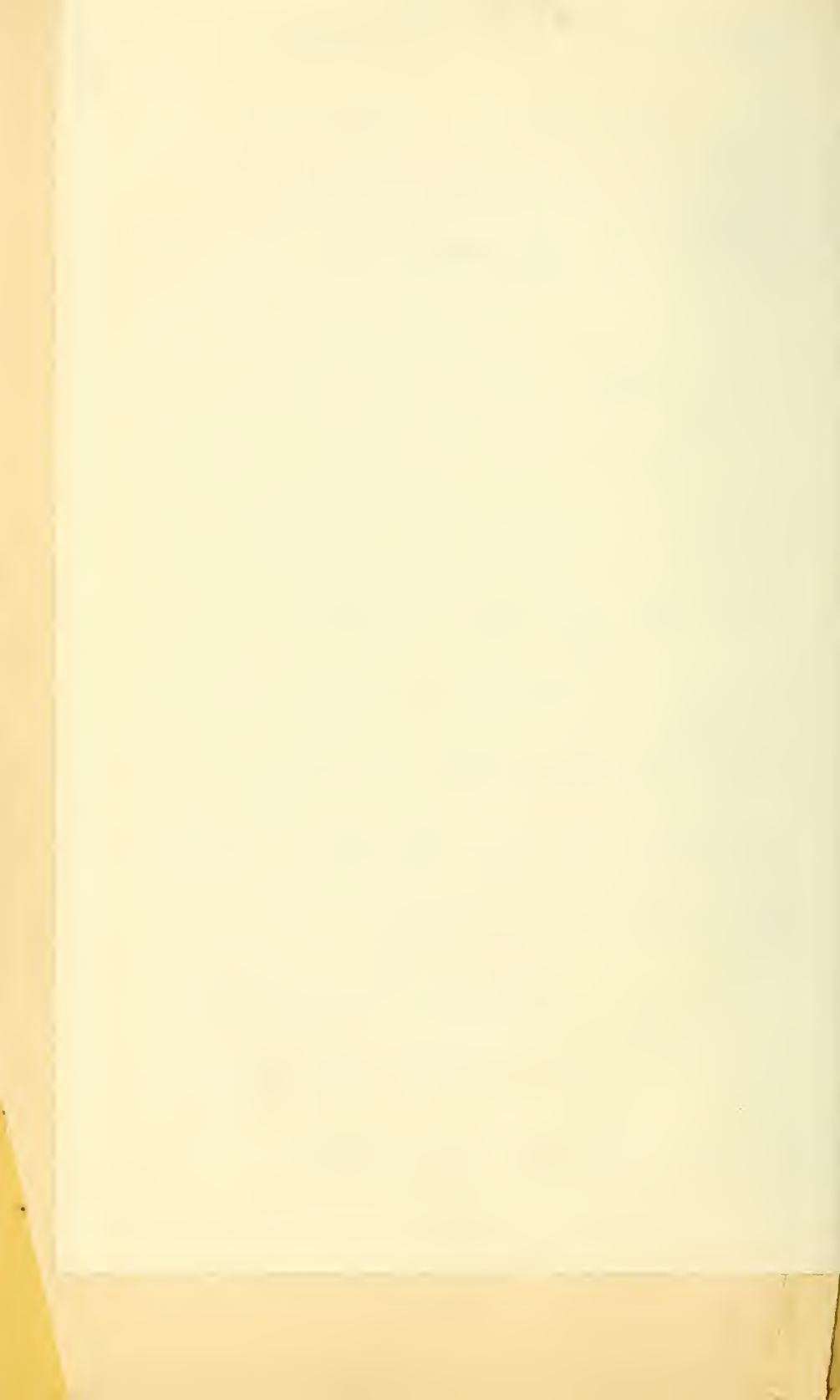
My dear Sir,

The amazing progress
of material interest in
the last Hundred Years,
being now in order, perhaps
the enclosed Essay may be
of service to you. If so
please accept it.

Very truly
yours

Charles L. Flint

Ed. Boston Daily Advertiser





J. J. Benson, Boston

H. W. Barth, Sc.

Charles S. Flint

SECRETARY OF THE MASS. STATE BOARD OF AGRICULTURE



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A HUNDRED YEARS' PROGRESS OF AMERICAN AGRICULTURE.

The Centennial Celebration, to take place in the city of Philadelphia in the year 1876, is to be a memorial of the struggles, the sacrifices, the heroic endurance, and the triumphs of our fathers in founding a free government, claimed to be the highest type of civil polity which the world has ever seen. As the time draws nigh, this grand occasion appeals to the pride, to the patriotism, to the reverence for the past, to the memory of the dead, to the highest and most unselfish feelings of every American heart, to make it a success, and, beyond all question, the grandest event of the sort which mankind has ever beheld. Anything short of this will fail of its purpose.

It is true the happiness and prosperity of a nation depend upon the union and the harmonious development of every variety of industrial pursuit; but the groundwork and the pillar of civilized society, on which its prosperity, its solidity and its glory must ultimately rest, is agriculture, the production of the means of sustaining a rapidly growing population. Commerce draws its life-blood from this; manufactures grow out of it. "They all stand together," as Webster said, "like pillars in a cluster, the largest in the centre, and that largest is agriculture."

A glance at the history of this great industry in the United States will therefore be found to possess much that is interesting, instructive and useful.

BEFORE THE REVOLUTION.

There is little need to look beyond the period of the Revolution in search of the first steps at any real progress in the agriculture of this country. The first European settlers upon these shores had to begin life anew, as it were, in the midst of untold hardships, privations, and dangers. They found a climate widely different from any which they had known before; a soil which the foot of civilized man had never trod, and natural productions which they had never seen. They brought with them little or no experience which could have fitted them for the rude struggle with nature in which they were about to engage. This they were forced to gain, painfully and laboriously enough, with the axe in hand to clear the forest, and the gun by their side to defend their lives. That progress in agriculture should have been slow is not, therefore, a matter of surprise. We must rather wonder that they got on at all in the struggle for life.

The different colonies, no doubt, had a somewhat different experience. The winters of Virginia were milder than those of New England, and the settlers on the James River suffered less from this cause than those farther north, but all were alike surrounded by a wilderness infested by savage men and by wild beasts, always ready to prey upon their live stock or to destroy their crops. For some months after landing there were, indeed, no cattle to be destroyed. The first animals imported into the colonies were those that arrived at the James River plantation some time previous to 1609, the exact date of their arrival not being known. In 1610 several cows were landed there, and a hundred more in 1611. The first may have been brought by the early adventurers, either at the time of their first voyage, in 1607, or soon after, but the later additions probably came from the West Indies, being the descendants of the cattle brought to America, in his second voyage, by Columbus, in 1493.

So important was it considered that the cattle should be allowed to increase and multiply that, according to old

authority, an order was passed forbidding the destruction of domestic animals, on pain of death to the principal, burning of the hand and cropping the ears of the accessory, and a sound whipping for the concealer of the facts. Such being the nature of the encouragement to the raising of stock, the number of cattle in the Virginia colony increased to about five hundred head in 1620, and to about thirty thousand in 1639, while the fact that the number had decreased to twenty thousand in 1648, would seem to indicate that the restriction had been removed. Many also had been sent to the colonies further north.

FIRST CATTLE IN NEW ENGLAND.

The first cattle that were brought to New England arrived at Plymouth in 1624, in the ship *Charity*. They were imported for the colony by Gov. Winslow, and consisted of three heifers and a bull. They possessed no uniformity of color, being black, black and white, and brindle. In 1626 twelve cows were sent to Cape Ann, and in 1629 thirty more, while in 1630 about a hundred were imported for the "governor and company of the Massachusetts Bay in New England." In the meantime a hundred and three cattle and horses were imported into New York from the island of Texel, Holland, by the Dutch West India Company; and in 1627, the settlements along the Delaware were supplied by the Swedish West India Company, so that by the year 1630 the number of horned cattle in all the colonies must have risen, by importations and by natural increase, to several thousands, to which were added in 1631, 1632, and 1633, many yellow cattle from Denmark, brought over by Captain John Mason, who was engaged in extensive lumbering operations along the Piscataqua River, in New Hampshire.

These were the sources from which our common or "native" cattle sprang. The earlier importations were undoubtedly more extensive than any subsequent ones, the colonists relying upon the natural increase to supply their wants, but there is historical evidence to show that there was more or less interchange of stock between the various colonies at an early date, and that this resulted in a mixture of blood, such as we find it now in our common stock.

We are to bear in mind, also, that the stock of the mother country and of various other countries from which the supplies of the colonists were drawn was not at that time improved as we find it in the present day. It was long before the interest in the improvement of stock had been awakened, and it is a historical fact that the ox of that day was small and ill-shaped, quite inferior to the ox of our own time; that the sheep has undergone a vast improvement, both in the fineness and value of its wool and the size and quality of the carcase, within the last century; that throughout the earlier part of the last century the average gross weight of the neat cattle sent to Smithfield market did not exceed three hundred and seventy pounds, and that of sheep twenty-eight pounds, while the average weight of the former is now over eight hundred pounds, and of the latter over eighty pounds. Nor is it probable, on account of the high price of cattle at that period, and the risks to which they were exposed, that the colonists obtained the best specimens then known. In fact the difference in animals, and what are now considered the best points and the highest indications of improvement, were nowhere understood or appreciated two centuries ago. That the cattle of the early settlers were poor of their kind, as compared with our ideas of the quality of similar animals, is, therefore, plain enough to be understood.

TREATMENT OF CATTLE.

In addition to this, the means of keeping stock of any kind, in such a manner as to secure any improvement in it, were not at hand. The early colonists had no notion of raising grass or hay for their animals by artificial means. They relied chiefly, and almost from necessity, upon the production of natural meadows and the grasses upon the salt-marshes along the sea-shore. The cattle, like their owners, had to browse for their lives, and through the long northern winters to live upon poor and miserable swale-hay. Death from starvation and exposure was not uncommon, and sometimes an entire herd fell victims to the severity of the season. The most terrible droughts were of frequent occurrence, and caused great distress. The Indian corn and the grasses perished to such an extent that both grain and forage for

stock, at times, had to be imported from England, to keep the people from starving, and to keep the cattle alive, even so late as 1750.

Of the mode of keeping cattle in the Virginia colony, Glover, a contemporary, as appears by the Historical Register, says: "All the inhabitants give their cattle in winter is only the husks of their Indian corn, unless it be some of them that have a little wheat straw, neither do they give them any more of these than will serve to keep them alive; by reason whereof they venture into the marshy grounds and swamps for food, where very many are lost." And Clayton, another contemporary authority, says that "they neither housed nor milked their cows in winter, *having a notion that it would kill them.*" A still later Swedish traveler, Kalm, after whom our beautiful mountain laurel, the *Kalmia*, was named, in speaking of the James River colony, in 1749, says:

"They make scarce any manure for their corn-fields, but when one piece of ground has been exhausted by continual cropping, they clear and cultivate another piece of fresh land, and when that is exhausted proceed to a third. Their cattle are allowed to wander through the woods and uncultivated grounds where they are half starved, having long ago extirpated all the annual grasses by cropping them too early in the spring, before they had time to form their flowers or to shed their seeds."

This statement will apply with nearly equal force to the other colonists at that date. That the description is strictly correct, I may quote from a distinguished Virginian, the Hon. James M. Garnett, who, in 1842, said:

"Previous to our Revolutionary war, as I have been told by the farmers of that day, no attempts worth mentioning were made to collect manure for general purposes, all that was deemed needful being saved for the gardens and tobacco-lots, by summer cow-pens. These were filled with cattle such as our modern breeders would hardly recognize as belonging to the bovine species. In those days they were so utterly neglected that it was quite common for the multitude starved to death every winter to supply hides enough for shoeing the negroes on every farm. This was a matter so generally and

constantly anticipated, that my own grandfather, as I have heard from unquestionable authority, was once very near turning off a good overseer because cattle enough had not died on the farm of which he had the supervision to furnish leather for the above purpose. When any cattle were fattened for beef, almost the only process was to turn them into the cornfields to feed themselves. Sheep and hogs were equally neglected."

BEGINNING OF GRASS CULTURE.

In order to realize still more fully the condition of the early settlers, so far as the treatment of their stock is concerned, we are to consider that no attention was paid to the culture of the grasses, even in England, in the early part of the seventeenth century, and that very few of the roots now extensively cultivated and used as food for stock had been introduced there. The introduction of red clover into England did not take place till 1633; that of sainfoin, not till 1651; that of yellow clover, not till 1659; that of white or Dutch clover, not till 1700. Of the natural grasses, our well-known timothy was first brought into cultivation in this country, and it was not cultivated in England until the year 1760. The culture of orchard grass was first introduced into England from Virginia in 1764. There is no evidence of any systematic or artificial cultivation of grasses there until the introduction of the perennial rye grass in 1677, and no other variety of grass-seed appears to have been sown for many years; not, indeed, till toward the close of the last century, upon the introduction of timothy and orchard grass. The *Edinburgh Quarterly Journal of Agriculture*, the highest authority in such matters, says the practice of sowing grass-seed was never known in Scotland previous to the year 1792. Such being the case, in a climate so severe as that of Scotland, it is not at all surprising that the custom in this country dates back only little more than a hundred years.

It is a somewhat curious fact that the modern improvements in cattle in England did not begin till after the systematic culture of the higher qualities of natural grass. It is not strange, therefore, that the colonists here, who had vastly greater hardships to encounter in the practical operations of

the farm, were slow to recognize the possibilities of improvement, or that their cattle, poor as they must have been at the outset, continued rather to depreciate than to improve in quality until sometime after the Revolution. The number increased, however, as the range of pasturage or browsing grounds was comparatively unlimited, so that the keeping of stock may be said to have assumed some importance in the older settlements, by the middle of the last century, when it had become comparatively safe from molestation.

EARLY FARM IMPLEMENTS.

One of the chief obstacles the early colonists had to encounter, to add to the hardships of their lot in the cultivation of the soil, was the difficulty of procuring suitable implements. A few, no doubt, were brought with them, but all could not obtain them in this way, and the only metal they had was made of bog-ore, and that was so brittle as to break easily and put a stop to their day's work. Most of their tools were made of wood, rude enough in construction, and heavy of necessity, and little fit for the purpose for which they were made. The process of casting steel was then unknown. It was discovered in Sheffield, England, but not till the middle of the last century, and then kept a secret there for some years. The few rude farming tools they had were for the most part of home manufacture, or made by the neighboring blacksmith as a part of his multifarious business, there being little idea of the division of labor, and no machinery by which any particular implement could be exactly duplicated.

PLOUGHS.

But it is recorded that as early as 1617 some ploughs were set to work in the Virginia colony, for in that year the governor complained to the company that the colony "did suffer for want of skilled husbandmen and means to set their ploughs on work; having as good ground as any man can desire, and forty bulls and oxen, but they wanted men to bring them to labor, and iron for the ploughs, and harness for the cattle. Some thirty or forty acres we had sown with one plough, but it stood so long on the ground before it was reaped it was most

shaken, and the rest spoiled with the cattle and rats in the barn." A contemporary resident of that colony says, in 1648, "We have now going near upon a hundred and fifty ploughs," and they were drawn by oxen. In 1637 there were but thirty-seven ploughs in the colony of Massachusetts Bay, and for twelve years after the landing of the Pilgrims the farmers had no ploughs, but were compelled to tear up the bushes with their hands, or with clumsy hoes and mattocks. It afterwards became the custom in the Massachusetts colony, for some one owning a plough to go about and do the ploughing for the farmers over a considerable extent of territory, and a town sometimes paid a bounty to any one who would keep a plough in repair for the purpose of going about to work in this way. The massive old wooden plough required a strong team, a stout man to bear on, another to hold, and a third to drive. The work it did was slow and laborious. The other tools were a heavy spade, a clumsy wooden fork, and, later, a harrow. I have had in my possession specimens of these forks, two hundred years old. It is difficult to see how they could have been made to do very effective work.

ON THE MISSISSIPPI.

The ploughs used by the French settlers upon the "American bottom," in Illinois, from the time of their occupation, in 1682, down to the war of 1812, were made of wood, with a small point of iron fastened upon the wood by strips of raw-hide, the beams resting upon an axle and small wooden wheels. They were drawn by oxen yoked by the horns, the yokes being straight and fastened to the horns by raw-leather straps, a pole extending back from the yoke to the axle. These ploughs were large and clumsy, and no small plough was in use among them to plough among corn till about the year 1815. They used carts that had not a particle of iron about them.

Among the forms of the old wooden plough that achieved something more than a local reputation during the last century was that known as the "Carey plough." It was more extensively used than any other, though its particular form varied very much according to the skill of each blacksmith or wheelwright who made it. The land-side and the standard were

made of wood, and it had a wooden mould-board, often roughly plated over with pieces of old saw-plate, tin, or sheet-iron. It had a clumsy wrought-iron share, while the handles were upright, held in place by two wooden pins. It took a strong man to hold it and about double the strength of team now required to do the same amount of work. The "bar-share plough," sometimes called the "bull plough," was also used, a flat bar forming the land-side, with an immense clump of iron, shaped like half a lance-head, into the upper part of which a kind of colter was fastened, which served as a point. It had a wooden mould-board fitted to the iron-work in the most bungling manner. A sharp-pointed shovel, held with the reverse side up, and drawn forward with the point in the ground, would give an idea of its work. Then there was the "shovel plough," in very general use in the middle and southern colonies; a roughly-hewn stiek was used for a beam, and into this another stiek was framed, upon the end of which there was a piece of iron, shaped a little like a sharp-pointed shovel. The two rough handles were nailed or pinned to the sides of the beam. A plough known as the "hog plough" was also used in some parts of the country in the last and early part of the present century, so called probably on account of its rooting propensity. Specimens of this plough were taken to Canada in 1808 for use there, which would seem that it was thought to be one of the best ploughs then made. These old forms of the wooden plough continued to be used with little or no improvement till sometime after the beginning of the present century. The wooden plough was liable to rapid decay.

As for most of the other implements of husbandry, they were very few and very rude. The threshing was done with the flail. The winnowing was done by the wind. Slow and laborious hand-labor for nearly all the processes of the farm was the rule, and machine labor the exception, till a comparatively recent date. Indeed, it has been said that a strong man could have carried on his shoulders all the implements used on his farm, except, perhaps, the old wooden cart and the harrow, previous to the beginning of the present century, and we know that the number as well as the variety of these tools was extremely small.

EARLY MODES OF CULTIVATION.

Of the crops raised by the early settlers, and upon which they relied chiefly for sustenance, Indian corn, pumpkins, squashes, potatoes, and tobacco, were mostly new to them. Few Europeans had ever seen them cultivated previous to their arrival here, but necessity soon showed their value, and from the Indians they learned how to grow them. It was a method followed with little change down to the opening of the present century. It was to dig small holes in the ground about four feet apart, put in a fish or two, drop the seed, four or six kernels of corn, and cover it up. The instrument used by the Indians for this purpose was made of a large clam-shell, but the colonists soon substituted the heavy mattock or grub-hoe. The James River settlers, under the tuition of the Indians, began to raise corn in 1608, and within three years after they appear to have had as many as thirty acres under cultivation. The Pilgrims found it under cultivation by the Indians on their arrival at Plymouth, and began its culture in 1621, manuring, as the Indians did, with alewives, then called "shads." An early chronicle of the Pilgrims says, "According to the manner of the Indians, we manured our ground with herrings, or rather shads, which we have in great abundance and take with great ease at our doors." And later: "You may see in one township a hundred acres together set with these fish, every acre taking a thousand of them; and an acre thus dressed will produce and yield so much corn as three acres without fish." In 1623 the drought was so severe and long protracted that the corn, planted very shallow and manured with these fish in the hill, soon began to wither and curl up, and on the higher lands it was ruined. And so in many years succeeding.

WHEAT.

Wheat was first sown by Gosnold, on Cuttyhunk, one of the Elizabeth Islands, in Buzzard's Bay, as early as 1602, when he first explored the coast. In Virginia, the first wheat appears to have been sown in 1611, and its culture continued to increase there till, in 1648, it is recorded that there were several hundred acres of it. But it soon after fell into great

disrepute as a staple crop, as the tobacco culture was found to pay a great deal better. For more than a hundred years after it was but little cultivated in that colony. Wheat was early cultivated by the Dutch colony of the New Netherlands, for it is recorded that in 1626 samples of that grain were taken to Holland to show what could be done in the new country. It is probable that the Plymouth colony began its culture within two or three years of the settlement, though there appears to be no distinct record of it until 1629, when wheat and other grains for seed were ordered from England.

But though the cultivation of wheat was begun almost simultaneously with the settlement of the several colonies, it did not attract very great attention for more than a century, Indian corn and, later, potatoes being relied upon for food to a much greater extent. It was soon found to be subject to blast and mildew in the eastern colonies. In July of 1663 "the best wheat," according to an old manuscript diary that I have consulted, "as also some other grain, was blasted in many places so that whole acres were not worth reaping. We have had much drought the last summer, and excess of wet several other springs, but this of blasting is the most general and remarkable that I yet heard of in New England." But it was "heard of" often after that, and to such an extent that it never became a very prominent crop in that part of the country. It is a matter of history that there never was a time in the eastern colonies when it was a sure and reliable crop, unless it be so now with our improved modes of tillage, deep ploughing, and thorough drainage.

RYE AND BARLEY.

Rye and barley were also introduced and cultivated by the early settlers, and it soon became the almost universal practice to mix the meal of the former with Indian meal in the making of bread. It is known to have been the custom as early as 1648, and probably it began at a considerably earlier date, perhaps as early as 1630. Oats were also introduced at the same time with rye. Captain Gosnold raised them with other grains on one of the Elizabeth Islands, on the southern coast of Massachusetts, in 1602. Though much more extensively grown than rye, they appear to have been used chiefly as food

for animals. The practice of sowing grass-seed, as we have seen, never became common in the colonies. It was not generally adopted till about the time of the Revolution, though here and there an individual farmer may have tried to see what he could do to help Nature clothe the surface of his old fields, but any general or systematic attempt to cultivate grasses for hay was wholly unknown and unthought of. This culture was of recent origin in this as well as in the mother country, and is the result of modern improvement in agriculture.

The culture of the potato, though introduced early in the history of the colonies, being among the seed ordered for the Plymouth Colony as early as 1629, was not recognized as a very important and indispensable crop till about the middle of the last century, when it had come to be widely known and esteemed as an article of food, for we know that in 1747 about seven hundred bushels were exported from South Carolina. It was the sweet potato that first came to be regarded as a delicacy in England, and the allusions of some rather early English writers undoubtedly refer to this, rather than the common potato.

CULTIVATION OF FRUIT.

Very little attention was paid to the raising of fruits previous to the Revolution, except for the manufacture of cider. The first apples were raised upon Governor's Island, in the harbor of Boston, from which, on the 10th of October, 1639. "ten fair pippens were brought, there being not one apple or pear tree planted in any part of the country but upon that island." The first nursery of young trees in this country was that planted by Governor Endicott on his farm at Salem, now Danvers, in 1640, and it is related that he sold five hundred apple-trees for two hundred and fifty acres of land. The systematic cultivation of fruit was not common in this country previous to the Revolution, nor did it become so till within the last fifty years. Orchards were set out upon many farms, but they were designed chiefly for cider. Much greater care, however, was taken to raise good fruits in New York, New Jersey, and Pennsylvania, than in New England, and several noted orchards and nurseries existed there in the latter part

of the last century and the early part of the present, but they were the exception to the general rule even there. Choice varieties of apples, pears, peaches, and cherries were known only to a few careful cultivators, and the number of varieties of these was quite limited as compared with the present day. Cider was plenty, but its quality was much less regarded than its quantity. It is stated that so late as 1824 there was not a nursery for the sale of apple and pear trees in New England. Trees had to be bought in New York or New Jersey, or imported from abroad. The first horticultural society in the country was established in New York, about the year 1820. It lived but eight or ten years, and then died. The Pennsylvania Horticultural Society was organized in 1827, and the Massachusetts in 1829. The orchard products, according to the last census, have now risen to \$48,000,000, and the general culture of fruit is rapidly progressing.

We are now prepared to appreciate the condition of our agriculture at the time of the outbreak of the Revolution. We have seen that the settlers had but poor and inefficient tools, poor and profitless cattle, poor and meagre crops, and poor and miserable ideas of farming. They had no agricultural journals, no newspapers of any kind, and few books, except the old family Bible. There were less than a dozen papers published in the country at the middle of the last century. There was not one in New England at the beginning of that century, but four in 1750, and these had but a very limited circulation in the rural districts. There was little communication from town to town. The facilities for travel were extremely limited. It was before the days of many stages even, and the liberalizing influence which modern travel and social intercourse exert. Everything was favorable to the growth of prejudice and of narrow-minded views.

RESTRICTIONS ON COLONIAL AGRICULTURE.

Moreover, it is to be considered that throughout all the days of the colonies, from the very outset, the policy of the home-government was to make the provinces a source of

profit to the mother-country. It was a rigorous rule that all manufactured articles were to be procured of England. The colonies were not allowed to produce such articles for themselves, or to do anything which should come in conflict with the industry of the old country. But if there were any articles that England was in need of, the industry of the settlers was confined to them, and they could sell them only to England and buy what they required only of her. They encountered new restrictions at every turn. The grants or charters were issued, in some cases to individuals, in others to companies, and this involved, as it was clearly understood to involve, self-government; but the home-government very soon began to claim the right and the power of confirming the several governors. Some of the colonies were forbidden even to cut down pine trees suitable for ship timber, on any pretence. They were denied the right to export wool to any place out of the king's dominions, to sell land to anybody except subjects of the British Crown, to ship any produce except in English vessels, to coin money, to do anything, in fact, which could lessen their dependence upon the mother-country. Every new step taken, even in settling and working new lands, was met by some new and burdensome restraint, intended to keep the colonists in leading-strings. A formal act of Parliament, passed soon after the beginning of the last century, denied the right of the colonists to make hats. The home-government was very indignant at the custom which the people had of working up their wool and flax into homespun cloth. They were forbidden to manufacture ore beyond the state of pig-iron. Thus the most oppressive restrictions bore upon colonial agriculture, as well as upon colonial commerce and manufactures, from the very outset of the settlements. They finally became so burdensome as no longer to be endured with patience, and led to an open rupture with the home-government, commonly known as the Revolution, at a time when the population of the whole country was considerably less than three millions, the general and popular estimate of three millions being supposed to be too high.

During the period of the Revolution farm production was brought to a partial stand-still, and, for some years after, it was in a state of extreme depression. It took time to recover from the effects of the struggle. Gradually, however, the importance of some effort to develop and improve the agriculture of the country was impressed upon the minds of the more intelligent and public-spirited of the people, men, for the most part, who were in advance of their time. The result of their deliberations was the formation of societies for the encouragement of agricultural improvement.

ORGANIZED EFFORT.

The South Carolina Agricultural Society was established in 1784; the Philadelphia Society for Promoting Agriculture, in 1785; the New York [city] Society, in 1791; the Massachusetts Society for Promoting Agriculture, in 1792. These were rather city than country institutions. They were very slow in reaching the common people. The average farmer of that day was not up to their standard of thought and observation. Their example, their teachings, their entreaties for aid, their reports and papers, fell comparatively dead upon the mass of the people. Farmers were not to be taught by men who never held the plough. They did not want anything to do with *theories*. Custom had marked out a road for them, and it was smooth and easy to travel, and, though it might be a circle that brought up just where it had started, it had the advantage, in the old farmer's mind, that in it he never lost his way. It didn't require any exertion of mind. His comfort, as well as his happiness, was based on a feeling of filial obedience to old usage that was hereditary in his being. It was born in the blood, and ruled him with an irresistible power. His field of vision was bounded and narrow, and his work was strictly *imitative*, so far as he could see, and in no way *experimental*. The old common law, based on precedent, custom, practice, was his guide and his rule. He would be governed by custom, not by reason. If ancient custom was *known* that was enough for him. It wasn't for him to doubt. To investigate would imply doubt. To investigate was to theorize. Theory is at the bottom of all investigation, and theory was a bugbear in his mind. The

logical result — that no improvement could be reached without investigation — had no terrors for him. He seldom read. The *written* word he received with distrust. It might contain principles, and it wasn't principles that he cared anything about, but *practice*. No matter whether founded on wisdom and experience or not, practice was the thing. It seemed to be his opinion that farming could not be improved though it might be injured by books. Its processes were so peculiar that they could be gained only by tradition.

It is probable that the events and the excitements of the Revolution itself, with the travel, the observation, and the social intercourse which it involved, had much to do with breaking up the impregnable barrier of prejudice and slavery to custom and precedent which ruled so strongly in the popular mind. Great passions which reach and stir up the lowest depths of the nation's heart have a liberalizing and progressive influence. They excite thought and awaken a spirit of inquiry. But that the picture is not in the least over-drawn is evident from the fact that here and there are a few specimens left to remind us that the leaven which the early societies infused among the people has not yet permeated the entire mass.

PUBLIC EXHIBITIONS.

But time brings its changes. Something more was felt to be needed, and a convention was held in Georgetown, in the District of Columbia, on the 28th of November, 1809, from which grew the Columbian Agricultural Society for the Promotion of Rural and Domestic Economy; and the first exhibition, probably, in this country, was held by that society on the 10th of May, 1810, with the offer of liberal premiums for the encouragement of sheep-raising, &c. Elkanah Watson exhibited three merino sheep in Pittsfield, Massachusetts, in the October following of the same year. It was an innovation upon old custom, and the occasion of much ridicule and contempt among the farmers of that day and generation, but it was the germ of the Berkshire County Agricultural Society, whose regular exhibitions began the year following, and are believed to have been the first county exhibitions ever instituted in this country.

The Massachusetts Society held its first exhibition at Brighton in 1816, offered a list of premiums, and instituted a ploughing-match; but it appears to have been rather with the design of testing the strength, training, and docility of the oxen than to improve the plough. The plough-maker, however, happened to be there with his eyes open, and there can be no doubt that this and similar exhibitions which soon followed gave a new impetus to the progress of agricultural mechanics.

CAST-IRON USED.

Improvements in the plough had begun, even before the close of the last century. A patent had been granted for a cast-iron plough to Charles Newbold, of Burlington, New Jersey, in 1797, combining the mould-board, share, and land-side, all cast together, and it was regarded by intelligent plough-makers as so great an improvement that Peacock, in his patent of 1807, paid the original inventor the sum of \$500 for the right to combine certain parts of Newbold's plough with his own. The importance of this implement was so great as to command the attention and study of scientific men to improve its form and construction, and Thomas Jefferson, in 1798, applied himself to the task, and wrote a treatise upon the requisite form of the mould-board, according to scientific principles, calculating the exact form and size, and especially the curvature to lessen the friction. I have in my possession his original manuscript of this essay, containing his drawings and calculations.

But these changes and improvements were not readily adopted by the farming community. Their introduction was far slower than any new invention that promised to economize labor and do better work would be at the present day. Many a farmer clung to his old wooden plough, asserting that cast-iron poisoned the ground and spoiled the crops. He required an ocular demonstration before paying his money for an iron plough. It was not so much the weight of the old plough as the form of the mould-board, and the construction of the various parts, that needed correction. Its draught was great, on account of the excessive friction. The share and mould-board were so attached as to make too blunt a wedge. Its action was not uniform, and it was difficult to hold, requiring

constant watchfulness and great strength to prevent it from being thrown out of the ground. To plough to any considerable depth it was necessary to have a man at the beam to bear down. The mould-board was often shod with iron to lessen the friction and prevent wear, but it was usually in strips, often of uneven thickness, so that the desired effect was not always attained. The cast-iron plough remedied these serious defects, and secured at least some greater uniformity in construction. The modifications of the mould-board, which resulted from a better understanding of the true principles of construction, have enabled the farmer to do vastly better work, and a greater amount of it in the same time, and at a less expenditure of strength, and to reap larger crops as the result of his labor, while the cost of the implement, considering its greater efficiency and its durability, is less by half, probably, than the old wooden plough.

WHAT WE HAVE GAINED.

There can be no doubt that the saving to the country from these improvements in the plough, within the last half century, amounts to many millions of dollars a year in the cost of teams, and some millions in the cost of ploughs, or that the aggregate of crops has been increased by them many millions of bushels. The plough has also been modified to adapt it to a much greater variety of soils. In the mode of manufacture, too, a vast improvement has taken place. Half a century ago it was made sometimes on the farm, sometimes by the village blacksmith, and the wheelwright. The work is now concentrated in fewer establishments, which make it a specialty. In Massachusetts, for example, in 1845, there were seventy-three plough-manufactories, making 61,334 ploughs and other instruments annually, while in 1855 the number of establishments had decreased to twenty-two, which made 152,686 ploughs, valued at \$707,176.86, annually. A very large plough-factory was established in Pittsburg, Pennsylvania, in 1829, and, as early as 1836, it was manufacturing as many as a hundred ploughs a day, by the aid of steam-power, to supply chiefly the Southern market. This establishment first made a hill-side revolving-beam plough, and the iron-centre plough, and more recently it has made a vast number of steel

ploughs, adapted to the prairie soils of the West. Another factory, in the same city, as early as 1836, made ploughs at the average rate of 4,000 a year. The two factories made 34,000 ploughs a year, valued at \$174,000.

There are now many other still larger factories, some of which make from ten to twelve hundred different patterns, adapted to every variety of soil and circumstances.

No one can for a moment doubt the vast superiority of the best of the ploughs of the present day over the old forms in common use half a century ago. They have greater pulverizing power; they are less liable to clog; while in lightness of draught, ease of holding, durability, cheapness, perfection of mechanical work, quality of material, completeness with which the surface is inverted and the weeds or stubble buried, uniformity of wear, regularity of turning the furrow-slice, and other respects, we have made a vast and unquestionable improvement. In short, mechanical principles are better understood and more intelligently applied. We have combined simplicity of construction with economy of power. A better knowledge of the strength of materials has enabled us to reduce the size of all the parts of farming-tools, and so to avoid the clumsiness of the older style of implements, and, at the same time, to secure much more effective work. We have made some progress, also, in substituting the principle of the spade, or the fork, for that of the plough, as the use of the rotary spader is a sufficient proof. We have made some progress in the application of steam to the operation of ploughing, and the wonderful performances of the steam-plough, in the few instances where it has been tried, have indicated the possibilities of the future, and shown that the time is not far distant when we shall have it in our power to develop the resources of the great West to an extent and with an economy never yet dreamed of.

THE HARROW.

The importance of a complete and perfect pulverization of the soil, to admit of the extension of the roots of plants, and the access of air and moisture, was never more fully realized than at the present time. As it is at best but partially effected by the plough, which crumbles and breaks down the

soil simply in the process of turning, something farther has always been required, and the harrow has been used for this purpose, to follow the plough, from time immemorial. With the early settlers this implement, like most others, was made of wood, of simple bars and cross-bars, furnished with wooden teeth. It was usually home-made, rude and clumsy enough. The first improvement was the substitution of iron for wooden teeth, which were afterward pointed with steel, when it was made lighter, so as to admit of being moved more rapidly through the soil.

The changes and improvements of this implement came very slowly, and it is scarcely twenty years since it can be said to have approached perfection. It has now assumed a more compact form and greater flexibility, certain parts of the frame-work being hinged together, so that any part can be lifted or raised without disturbing the working of the rest, while particular forms have been made for special purposes, like the Shares and the Nishwitz, admirably adapted to mellowing the surface of newly broken land without tearing up the inverted sod. The rotary and the smoothing harrow may be mentioned, also, as a vast improvement upon the old styles. These and many other patterns, after which the harrow is made, seem to leave little to desire in the form and efficiency of this most important implement.

SMALLER FARM TOOLS.

A large class of the most valuable labor-saving implements may be mentioned which are almost entirely due to modern ingenuity, such as the cultivators, the horse-hoes, the grubbers, the drills and seed-sowers, and others of a similar character. By means of the horse-hoe and the cultivator the soil can be frequently stirred among growing crops, at a slight expense, thus enabling them to withstand the effects of drought, giving us, practically, a greater control over the seasons. Many of these smaller machines are wonderfully perfect and well adapted to the purpose for which they were constructed. And while mechanical invention has been active in this direction, our shovels, spades, hoes and forks have been vastly improved and made more effective, till, for lightness and finish, in combination with strength and durability, they are

unsurpassed by any similar tools in any part of the world; while the rapidity with which they can be manufactured, and the consequent cheapness with which they are sold, are among the marvels of modern mechanics.

The manufacture of these important articles was undertaken, to be sure, even before the Revolution, and as early as 1788 the iron-plated shovels made in Bridgewater, Massachusetts, gained the credit of being superior in workmanship to the best imported shovels of that day, and they undersold them at the same time. A large shovel-factory was established at Easton, Massachusetts, about seventy years ago, and as early as 1822 it was making about 30,000 shovels a year. By improvements in the process of manufacture, the patents for which were issued in 1827, the proprietor gained so high a reputation and such an increase of business, that by 1835 he was making about forty dozen shovels and spades per day, each shovel, in the systematic division of labor, passing through the hands of no less than twenty different workmen. The same establishment can now produce over two hundred and fifty dozen a day.

THE WORK CONCENTRATED.

It may be stated that cast-steel shovels were first patented in 1828, but cast-steel hoes were made by two different establishments in Philadelphia as early as 1823. Shovels and hoes were made at Pittsburg, Pennsylvania, in considerable quantities previous to the year 1803, and by the year 1831 steel hoes were made there so as to be sold at the rate of \$4.50 a dozen, only half the price of the iron hoe ten years earlier. Two factories in that city, in 1836, were able to make steel hoes at the rate of 1,600 dozen, besides 8,000 dozen shovels and spades a year, in addition to a large quantity of other tools; while, in 1857, four large establishments there made 32,000 dozen hoes and 11,000 dozen planters' hoes, a half million dollars' worth of axes, and large quantities of picks, mattocks, saws, &c. These facts are alluded to simply to show how this industry has become concentrated in large establishments, where perfection can be attained by the division of labor. There are many similar establishments in various parts of the country.

But perhaps the most important of modern agricultural inventions are the grain-harvesters, the reapers, the mowers, the threshers and the horse-rakes. The sickle, which was in almost universal use till within a very recent date, is undoubtedly one of the most ancient of all our farming implements. Reaping by the use of it was always slow and laborious, while from the fact that many of our grains would ripen at the same time, there was a liability to loss before they could be gathered, and practically there was a vastly greater loss from this cause than there is at the present time.

THE CROWNING GLORY.

It is not, therefore, too much to say that the successful introduction of the reaper into the grain-fields of this country has added many millions of dollars to the value of our annual harvests, by enabling us to secure the whole product, and by making it possible for the farmer to increase the area of his wheat-fields, with a certainty of being able to gather the crop. Nothing was more surprising to the mercantile community of Europe than the fact that we could continue to export such vast quantities of wheat and other breadstuffs through the midst of the late rebellion, with a million or two of able-bodied men in arms. The secret of it was the general use of farm-machinery. The number of two-horse reapers in operation throughout the country, in the harvest of 1861, performed an amount of work equal to about a million of men. The result was that our capacity for farm production was not materially disturbed.

The credit of the practical application of the principles involved in this class of machines undoubtedly belongs to our own ingenious mechanics; for though somewhat similar machines were invented in England and Scotland many years ago, they had never been proved to be efficient on the field, and had never gained the confidence of the farmers, even in their neighborhood; while the patent issued to Obed Hussey, of Cincinnati, in 1833, and another issued to McCormick, of Virginia, in 1834, not only succeeded in the trials to which they were subjected, but gained a wide and permanent reputation. Many patents had been issued in this country previously, the first having been as early as 1803, but they had

not proved successful. Hussey's machine was introduced into New York and Illinois in 1834, into Missouri in 1835, into Pennsylvania in 1837, and in the next year the inventor established himself in Baltimore. McCormick's machine had been worked as early as 1831, but it was afterwards greatly improved, and became a source of an immense fortune to the inventor. He took out a second patent in 1845, fifteen other machines having been patented after the date of his first papers, including that of the Ketchum, in 1844, which gained a wide reputation.

NATIONAL TRIALS.

The first trial of reapers, partaking of a national character, was held under the auspices of the Ohio State Board of Agriculture in 1852, when twelve different machines and several different mowers were entered for competition. There was no striking superiority, according to the report of the judges, in any of the machines. A trial had been held at the show of the New York State Agricultural Society, at Buffalo, in 1848, but the large body of farmers who had witnessed it were not prepared to admit that the work of the machines was good enough to be tolerated in comparison with the hand-scythe. Some thought they might possibly work in straight, coarse grass, but in finer grasses they were sure to clog. The same society instituted a trial of reapers and mowers at Geneva in 1852, when nine machines competed as reapers and seven as mowers. Only two or three of the latter were capable of equalling the common scythe in the quality of work they did, and not one of them all, when brought to a stand in the grass, could start again without backing to get up speed. All the machines had a heavy side-draught, some of them to such an extent as to wear seriously on the team. None of them could turn about readily within a reasonable space, and all were liable to tear up the sward in the operation. The old Manning, patented in 1831, and the Ketchum machines were the only ones that were capable of doing work that was at all satisfactory. One or two of the reapers in this trial did fair work, and the judges decided that, in comparison with the hand-cradle, they showed a saving of 88 $\frac{3}{4}$ cents per acre. Here was some gain certainly, a little posi-

tive advance, but still most of the reapers, as well as the mowers, did very inferior work. The draught in them all was very heavy, while some of the best of them had a side-draught that was destructive to the team.

BEFORE THE WORLD.

The inventive genius of the country was stimulated by these trials to an extraordinary degree of activity. Patents began to multiply rapidly. Local trials took place every year in various parts of the country to test the merits of the several machines. The great International Exposition at Paris in 1855 was an occasion not to be overlooked by an enterprising inventor, and the American machines, imperfect as they were at that time, were brought to trial there in competition with the world. The scene of this trial was on a field of oats about forty miles from Paris, each machine having about an acre to cut. Three machines were entered for the first trial, one American, one English, and a third from Algiers, all at the same time raking as well as cutting. The American machine did its work in twenty-two minutes, the English in sixty-six, and the Algerian in seventy-two.

At a subsequent trial on the same piece, three other machines were entered, of American, English, and French manufacture, when the American machine did its work in twenty-two minutes, while the two others failed. "The successful competitor on this occasion," says a French journal, "did its work in the most exquisite manner, not leaving a single stalk ungathered, and it discharged the grain in the most perfect shape, as if placed by hand for the binders. It finished its piece most gloriously." The contest was finally narrowed down to three machines, all American. Two machines were afterwards converted from reapers into mowers, one making the change in one minute, the other in twenty. Both performed their task to the astonishment and satisfaction of a large concourse of spectators, and the judges could hardly restrain their enthusiasm, but cried out "Good, good!" "Well done!" while the excited people who looked on hurried for the American reaper, crying out, "That's the machine!" "That's the machine!" The report of a French agricultural journal said: "All the laurels, we are free to

confess, have been gloriously won by Americans, and this achievement cannot be looked upon with indifference, as it plainly foreshadows the ultimate destiny of the New World."

ANOTHER ADVANCE STEP.

Five years after the Geneva trial there was a general desire to have another on a scale of magnificence that should bring out all the prominent reapers and mowers of the country. The United States Agricultural Society accordingly instituted a national trial at Syracuse, New York, in 1857. More than forty mowers and reapers entered, and were brought to test on the field. It was soon apparent that striking improvements had been made since the meeting at Geneva. The draught had been very materially lessened in nearly all the machines, though the side-draught was still too great in some of them. Most of the machines could now cut fine and thick grass without clogging, and there was a manifest progress in them, but of the nineteen that competed as mowers, only three could start in fine grass without backing to get up speed. The well-known Buckeye, patented only the year before, won its first great triumph here, and carried off the first prize.

Every year now added to the list of new inventions and improvements. In 1859 the Wood mower was invented, and soon gained a high reputation. By the year 1864 there were no less than a hundred and eighty-seven establishments in the country devoted to the manufacture of reapers and mowers, many of them very extensive, and completely furnished with abundant power, machinery and tools of the most perfect description, while the work had become wisely and thoroughly systematized. The people directly sustained by these factories exceeded sixty thousand, while the value of their annual product exceeded \$15,000,000, the number of machines amounting to one hundred thousand.

SOMETHING NEAR PERFECTION.

Nine years after the Syracuse trial, another exhibition of mowers and reapers, national in its character, was held at Auburn, New York, under the auspices of the New York State Society, in July, 1866. The number of mowers that

entered, single and combined, was forty-four; the number of reapers, thirty; or seventy-four in all. It was plain at a glance, that a decided improvement had taken place in workmanship and mechanical finish. The mowers were more compact, simpler in construction, lighter, and yet equally strong; they ran with less friction; the draught was easier, and the machines generally were less noisy; they cut the grass better, and were capable of working over uneven surfaces. The committee say in their report: "Those who had been present at former trials were astonished at the general perfection which had been attained by manufacturers of mowing-machines. Every machine, with two exceptions, did good work, which would be acceptable to any farmer; and the appearance of the whole meadow, after it had been raked over, was vastly better than the average mowing of the best farmer in the State, notwithstanding the great difficulties that had to be encountered. At previous trials, very few machines could stop in the grass and start without backing for a fresh start. At the present trial every machine stopped in the grass and started again without backing, without any difficulty, and without leaving any perceptible ridge to mark the place where it occurred."

We may here note the rapid progress of these most valuable labor-saving machines, for while, in the earlier trials, only one or two mowers met with any success whatever,—no one doing what practical farmers could call good work,—in this trial forty-two of the forty-four machines entered did their work well. In the early contests even a partial success was the rare exception; in the late, failure was the equally rare exception. In 1850 less than five thousand machines had been made and put into use, and few if any of them gave satisfaction. Now there is scarcely a farm of any size in the country but has its mowing-machine. It is one of the grandest agricultural inventions of modern times, and yet we see that it is less than twenty years since doubts were freely entertained as to whether it would ever become practically useful, whether the numerous mechanical obstacles would be entirely overcome. Its triumph has been complete. We have now many mowers that have not only a national but a world-wide reputation. The successful introduction of these ma-

chines was an immeasurable step in advance upon the old methods of cutting grass. They come in at a season when the work of the farm is peculiarly laborious, when labor is held at higher than the usual high rate of wages, when the weather is often fickle, either oppressively hot and trying to the physical system, or "catchy" and lowering, and they relieve the severest strain upon the muscles at the time of harvest. Our reapers are at the same time self-rakers. We can reap and gather from fifteen to twenty acres a day in the most satisfactory manner.

MAKING AND GATHERING HAY.

The horse hay-rake was invented at an earlier date than the mowing-machine. It has been used in this country nearly seventy years, and the saving by its use, sixty years ago, was estimated to be the labor of six men in the same time. The work to be performed in raking hay, though slow, is comparatively light. It does not require the exertion of a very great amount of strength. It is just such kind of work where the application of animal power becomes of the greatest advantage, because it multiplies the efficiency of the hand many times. The same thing is noticed in the use of the hand-drills for sowing small seeds, the tedder for turning and spreading hay, and in other similar operations. The labor of a good horse-rake is equal to that of eight or ten men for the same time, and from twenty to thirty acres a day can be gathered by a single horse and driver, and that without over-exertion. In the economy of labor the horse-rake must be regarded as second only in importance to the mower and the reaper, and is considered as essential upon the farm as the plough itself.

The tedder is another invention of still more recent date. With the introduction of the mower, by which grass could be cut so rapidly, and the horse-rake by which it could be gathered more rapidly than ever before, there was still wanting some means by which it could be cured proportionally quick, something to complete and round out the new system, as it were, to make the revolution in the process of hay-making entire. Various forms of the tedder had been patented and used in England, but they were too heavy and cumbersome

for American use, and it was left to our own inventors to meet and overcome the mechanical obstacles in the way of success here. This they have done, and we have so far economized labor in this direction, that the tedder is now regarded as of nearly equal importance with the mower and the horse-rake.

To these appliances for lightening and shortening the labors of haying, have been added many forms of the horse-fork for unloading and mowing away hay in the barn or upon the stack. Few machines have met with greater popular favor than the horse pitch-fork, for it saves not only the most violent strain upon the muscles, but economizes time, which, in the hurry of haying, is often of the utmost importance. The American hand-forks had been brought so near perfection, by their high finish, lightness and strength, as to leave little to be desired, but the horse-fork has been so generally introduced as, to a considerable extent, to supersede their use.

GRAIN SEPARATORS.

While these vast improvements have been going on with the other implements of the farm, the improvement in machines for threshing grain has been rapidly progressing, till they have reached a wonderful degree of perfection. Most of us can remember when the old-fashioned flail was heard upon almost every barn floor in the country. Here and there was a case where the grain was trodden out by cattle, with an amazing waste of time and labor. Compare those slow methods with the process, widely known at the present day, by which a horse-power or steam-power thresher not only separates the grain but winnows it, measures it, bags it ready for market, and carries away the straw to the stack, at the same operation, and all with a rapidity truly astonishing. The first successful attempt to construct a threshing-machine was made in this country in 1792, by Col. Anderson of Philadelphia. It answered the purpose well, but the inventor did not follow it up so as to secure its general introduction. Other patents were subsequently issued to American inventors, but they were not successful in introducing them. Scotch machines were introduced into New York, Pennsyl-

vania, and Delaware in 1802, but they were too complicated and were soon laid aside. An English machine was introduced in 1816 that proved a success in respect to speed and ease of cleaning grain, and portability, but subsequent inventions have so far surpassed all these comparatively early attempts, that they have superseded them, and later American machines have been used for many years.

As early as the Paris Exposition of 1855 the victory was won by an American machine. To ascertain the comparative rapidity and economy of threshing, six men were set to work at threshing with flails. In one hour they threshed 36 litres of wheat. In the same time Pitt's American machine threshed 740 litres; Clayton's English machine threshed 410 litres; Duvoir's French machine threshed 250 litres; Pinet's French machine threshed 150 litres. Speaking of this trial a French journal said: "This American machine literally devoured the sheaves of wheat. The eye cannot follow the work which is effected between the entrance of the sheaves and the end of the operation. It is one of the greatest results which it is possible to attain. The impression which it produced on the Arab chiefs was profound." Good as that machine was at that time, it has been greatly improved since then; and it is a fact that wherever our first-class machines have come into competition with those of European manufacture, they have invariably proved themselves superior in point of simplicity, rapidity, and perfection of work.

OTHER IMPLEMENTS.

Nor has the progress in the improvement of other indispensable machines of the farm been less marked and important. The smaller implements have felt the impress of the mechanical genius of the age. The corn-sheller has been brought to such perfection as to separate the corn from the ear with great rapidity, and with the application of little power. It has been adapted to horse-power also, and to different sections of country, where different varieties of corn are raised, and to shell one or two ears at the same time. Its economy of time and labor is such as, upon large farms, where the product is large, to pay for itself in a single year.

The hay-cutter is another machine of modern invention. Wherever a large stock of cattle is kept, especially where a considerable number of horses are wintered, it is often thought to be good economy to feed out more or less of the coarser feeding substances of the farm, as straw, corn-stover, the poorer qualities of hay, etc., by mixing them, either with the better qualities of hay or with some sort of concentrated food, like meal. The hay-cutter is adjustable so as to cut at different lengths, according to the wants of the stock for which it is designed. The point is to cut short and with perfect regularity, and when this quality is attained in a machine, uniting strength, simplicity, durability, and safety to the operator, it is estimated that there is a gain of about 25 per cent. in the economy of feeding, in the increase of thrift secured, and the positive advantage to be derived in the manure. There is a difference of opinion upon this point, to be sure, but notwithstanding that, the use of some form of the hay and straw cutter has become nearly universal, and is generally regarded as quite indispensable upon most well conducted farms. Machines for this purpose are made to be worked by hand upon small farms, and by horse or steam-power upon larger ones, where they are capable of reducing to chaff a ton and a half of hay or straw per hour.

Root and vegetable cutters have been brought to equal perfection, and where large stocks of sheep and cattle are kept, and vegetables are raised for winter feeding, as they are at the present time upon all well managed farms, the root-cutter is indispensable. By its use the farmer is now enabled to cut potatoes and other vegetables fine enough to feed to sheep, at the rate of a bushel in less than thirty seconds, by simple hand-power.

Nothing need be said of the innumerable variety of churns, hand cider-mills, the contrivances for gaining power in lifting stones and pulling stumps, ditching-machines, rollers, and a thousand other labor-saving machines which mechanical ingenuity has added to the stock of farm-tools, till the value of farming implements and machinery was reported, by the census of 1870, to be at least \$336,878,429. The same was reported, in 1860, at \$246,118,141, and in 1850 at only \$151,587,638, a gain in twenty years of \$185,290,791.

As evidence that the mechanical genius of the country is not yet exhausted, but is as untiring as ever, it may be stated that the patents issued for improvements in agricultural implements and machinery for the year 1872 exceeded one thousand, of which thirty-six were for rakes, one hundred and sixty for hay and grain harvesters and attachments, one hundred and seventy-seven for seed planters and drills, thirty for hay and straw cutters, ninety for cultivators, seventy-three for bee-hives, ninety for churns, and one hundred and sixty for ploughs and attachments ; and that the annual manufacture of agricultural implements amounts to over \$52,000,000.

THE KING OF CEREALS.

Having alluded briefly to the wonderful progress made in the improvement of the implements of the farm, by means of which the possibility of production has been so largely increased, let us consider for a moment the practical results attained.

Indian corn has always been regarded as the great staple crop of the country. It is a plant of American origin. In the universality of its uses, and its intrinsic importance to mankind, no other grain can be compared with it. Its flexibility of organization is such that it readily adapts itself to every variety of climate and soil, from the warmest regions of the torrid zone to the short summers of Canada. The early settlers, as we have seen, found it in cultivation by the Indians, and it soon became the leading crop throughout the country, the crop upon which the colonists relied, not only for food, but for sale and exchange for other necessities of life. It soon became a prominent article of export, especially from the Middle States,—New Jersey, Pennsylvania, and Delaware,—and, to some extent, from the States farther south. Thus, in 1748, South Carolina exported 39,308 bushels, and in 1754, 16,428 bushels. In 1755, there were exported from Savannah 600, and in 1770, 13,598 bushels. And so, in 1753, North Carolina exported 61,580 bushels ; and the exports from Virginia, before the Revolution, sometimes amounted to 600,000 bushels a year. The total amount exported from all the colonies, in 1770, was 578,349 bushels. These figures

are not large, to be sure, when compared with the immense exportation of this grain at the present day, but they serve to show that, even before the Revolution, Indian corn had come to be regarded as an important money crop, as well as a prime necessity for home consumption. They show a surplus beyond the wants of the population at that time.

PRACTICAL RESULTS.

Nothing will more clearly demonstrate the exceedingly slow progress of our agriculture after the Revolution than the fact that, in 1791, the export of corn, including 351,695 bushels of meal, amounted to only 2,064,936 bushels; in 1800, to only 2,032,435 bushels, including 338,108 bushels of meal, while in 1810 it fell down to 140,996 bushels, of which 86,744 bushels were in the form of Indian meal. That was before the avenues to the great West were opened. It was at a time when the inland farmer had no available market, the cost of transportation of so bulky a product making it impracticable to team it to any great distance. It was before its real value as an article of human food was appreciated in Europe, and when its consumption as such was very small. It was before our cattle had been much improved, and when their number was much smaller than it is now, when it has come to be realized that it makes our beef, our mutton, our pork and our poultry.

Nor did the production materially increase till within the last forty years. The Erie Canal was not open till the year 1825; nor were there any railroads to facilitate the transportation of merchandise; but the gradual extension of settlements westward after that date, and the increase of population, led to an increase of production, till, in 1840, when this crop first appears in the census, the yield had risen to 377,531,875 bushels; and from that time its increase has been quite marvellous, for in 1850 it had reached to within a small fraction of 600,000,000 bushels (or, more nearly, 592,071,104), occupying 31,000,000 acres of land. Its value was reported at that date as \$296,034,552. It was a gain of 57 per cent., or 214,539,229 bushels in ten years, while the increase of population in the same time was but 35 per cent. It formed about three-sixteenths of the whole agricultural production of the

country, occupied more than three-tenths of the improved land, and amounted to more than $25\frac{1}{2}$ bushels for each inhabitant. The export of this grain rose in value in 1856 to nearly \$9,000,000.

This wonderful rapidity of increase continued, partly on account of the vast improvement in agricultural implements and the means of raising the crop, partly on account of the multiplicity of railroads and market facilities, till, in 1860, it amounted to 838,792,742 bushels; but it had fallen off somewhat in 1870, for it is reported then as 760,944,549 bushels, a portion of the land evidently having been devoted to wheat, which had very largely increased in the same time. When it is considered that our agricultural resources are still but partially developed, the product of this cereal appears to be truly amazing.

WHEAT CULTURE.

Nor is the growth of wheat in this country less important than that of Indian corn. In some respects it is even more so. It is the brain-food of the world. It has been said that the progress of civilization and intellectual culture can be traced from one degree to another by the extent of its growth and consumption. It is gratifying, therefore, to find that our present annual production of this cereal amounts to nearly 300,000,000 bushels, and that our ability to increase it is capable of an almost unlimited expansion. It has always entered into our exports to an extent dependent chiefly upon the foreign demand, and experience has proved that the surplus of this grain, the amount we could spare from home consumption, is as elastic as Indian-rubber. If Europe needs our wheat or our flour, and is ready to pay us good prices, either from a short crop, a disturbed state of political affairs, or from any other cause, no one could set bounds to our surplus, because the more she wants the more we have to spare, and the less she requires, the more freely is it used at home.¹ In other words, the amount of exports will be regulated chiefly by the price, and if foreign countries are willing, or are compelled to pay for it, we can supply them to any extent under any ordinary circumstances. The export, for instance, in 1850, amounted to little more than eight millions

and a half, while in 1854 it went up to over twenty-seven millions of bushels.

We have seen that wheat was cultivated, to some extent, by the early settlers of the country. Occasionally, to meet the exigency of a short crop in England, France, Portugal, Spain, or the West Indies, it was exported, to some extent, in the early part of the last century. By the year 1750, New Jersey had come to take the lead of all the Colonies in raising wheat, and may be regarded as at that time the great centre of the wheat-growing region. Its culture had grown to be very considerable along the Hudson and Mohawk, and in Pennsylvania. Maryland, Virginia, and the provinces further south had made tobacco the leading object of culture, almost from the first of their settlement, and this crop constituted for a long time the most important export from the British provinces, though North Carolina had shipped, on an average, about 130,000 barrels of pitch, tar and turpentine, and South Carolina considerable quantities of rice. But the product of tobacco had been diminishing for some years previous to the Revolution, on account of the exhaustion of the soil for that crop, and the planters there had turned their attention, to a greater extent, to the growing of wheat and other grain. They could by law export tobacco only to Great Britain, but they could ship wheat, flour, lumber, &c., to the West Indies and elsewhere. Wheat, therefore, had begun to enter into the exports of the more southern provinces prior to the Revolution.

INCREASE OF PRODUCTION.

But that the production of wheat and flour had not risen to anything like the relative importance which it holds at the present time, will appear from the fact that in 1791 the export of this grain was but 1,018,339 bushels, and 619,681 barrels of flour; while in 1800 it was but 26,853 bushels of wheat and 653,052 barrels of flour. In 1810 the amount sent abroad was 325,024 bushels of wheat and 798,431 barrels of flour. No statistics of the actual production of this grain were gathered previous to the census of 1840, but it is reported in that year to have been 84,823,272 bushels. From that time to 1850 the increase appears to have been but 15

per cent., the product, at the latter date, being 100,485,944. In that year, or rather in 1849, on which the return is based, Pennsylvania produced more than any other State in the Union, or 15,367,691 bushels. Its product at the last census was nearly 20,000,000, but the centre of production has moved farther and farther to the west.

Since the practicability and economy of the reaper and other machinery became certain, the increase in the production of wheat has been more rapid, as appears from the fact that in 1860 the crop amounted to 173,104,924 bushels, and in 1870 to 287,745,626 bushels. Our exports of this cereal in 1860 amounted to about 12,000,000 bushels, in 1861 to over 20,000,000, and in 1862 to very near 30,000,000, a greater quantity than had ever been known before. In addition to the vast increase of this crop in the Middle and Western States, the production of wheat in California now comes in to swell the aggregate capacity of expansion, to an extent worthy of notice; for while in 1850 her product of wheat is returned as only 17,228 bushels, her yield of 1870 was nearly 17,000,000 bushels, with her resources but slightly developed. And when it is considered that the great Northwest,—Iowa, Minnesota, and the region lying beyond them,—still remains, to a large extent, unoccupied, there seems no reason to apprehend that the growth of this important crop will not continue to increase in the future as rapidly as it has in the past.

The other smaller grains have never occupied so prominent a position in our agriculture, being grown more especially for home consumption, but in the aggregate they constitute no mean item of our national agricultural wealth. Thus our rye-crop, as returned in 1870, amounted to nearly 17,000,000 bushels, our barley to nearly 30,000,000, our buckwheat to nearly 10,000,000, and our oats to over 282,000,000. Rice, which in 1860 was reported at 187,167,032 pounds, had fallen off in 1870 to 73,635,021 pounds.

THE POTATO.

The potato is more universally cultivated than any other plant except, perhaps, Indian corn. It is scarcely more than a hundred years since it became universally recognized as an

indispensable farm product. During the latter part of the last century, and the earlier part of the present, its cultivation in new soils was so easy, and its yield so abundant, that it became an important article of food. No account was taken of it in the census, however, till 1840, when the yield was reported as 108,298,060 bushels. Since that time the liability to disease has become so great that the production has not increased in the same ratio as many other crops, though the amount, by the census of 1870, including over 20,000,000 sweet potatoes, was 165,047,297 bushels. It has at times formed no inconsiderable item of export, though by no means to be compared in this respect with wheat and Indian corn. It is largely used in the feeding of stock in some sections of the country.

AN EARLY EXPORT.

The culture of tobacco was undertaken by the settlers in Virginia from the very outset of the colony. It is recorded that in 1615 the gardens, fields, and streets of Jamestown were planted with tobacco. It immediately became not only the great staple crop, but the principal currency of the colony. By the year 1622 the product amounted to 60,000 pounds, and it more than doubled in the next twenty years. The culture of this plant was introduced into the Dutch colony of New York in 1646, though it never gained the prominence there that it did farther south. But Maryland, the Carolinas, Louisiana, and later, Kentucky, made it the leading object of their culture almost from their first settlement. It long constituted the most valuable export of British America; but the product per acre had been diminishing for many years before the Revolution, owing to the difficulty of supplying manure, and the consequent exhaustion of the soil. But from 1744 to 1776 the exports of this crop averaged 40,000,000 pounds a year.

Tobacco has now become a somewhat prominent crop in Massachusetts and Connecticut, and in both of these States its culture is rapidly extending. In 1850, for instance, but 138,246 pounds were raised in Massachusetts; in 1860 the crop increased to 3,233,198 pounds, and in 1870 to 7,312,885, while the crop of 1872 is probably at least 25 per cent. greater

still. The aggregate yield of the country in 1840 was reported by the census of that year as 219,163,319 pounds, while in 1850 it was reduced to 199,752,655 pounds; but in 1860 it went up to 434,209,461 pounds, to fall again in 1870 to 262,735,021 pounds, a fluctuation to be explained in part by the many casualties to which it is liable, as damage by insects, hail, drought, frosts, &c.

THE COTTON SUPPLY.

The cotton crop of the country has grown up entirely within the last hundred years. The first improvements in the process of spinning it in England were not made till the invention of Arkwright, in 1769, and the spinning-jenny of Hargreaves in 1770, and comparatively little cotton had been raised in our Southern States previous to 1793, when Eli Whitney invented the cotton-gin. Up to that time the difficulty of freeing the cotton from the seed had been such that one hand could clean but a pound a day, and even at the high price of 25 or 30 cents a pound it could not be made profitable. By Whitney's invention a hand, instead of one pound, could clean 360 pounds a day. At about the same time steam was introduced as a motive-power in England, and that, with the great improvements in carding and spinning, enabled one man to do the work which it had previously required 2,200 men to do, in the same time, by the old methods.

Machinery had introduced an entirely new condition of things. The effect of it was to produce a vital change in the state of affairs at the South, and the cotton crop very rapidly grew up to immense importance, constituting about a third part of the whole exports of the country. Each decade showed an increase of about 100 per cent. in production, till, in 1840, it had reached 744,000,000 pounds, six times the product of 1820. The quantity of cotton exported in 1792 was only 138,328 pounds. The quantity exported in 1860 was 1,765,115,735 pounds, or 4,412,789 bales of 400 pounds each, but the quantity produced in 1860 was 2,079,230,800 pounds, or 5,198,077 bales. This production had fallen off somewhat in 1870, when the quantity produced was reported as 3,011,996 bales, or 1,204,798,400 pounds.

THE HAY-CROP.

The hay-crop of the country has also grown up almost entirely within the last hundred years, and considering the necessity that exists throughout all the northern portions of our territory for stall-feeding all stock from three to six months of the year, it has an importance there which it cannot have farther south. It has been asserted that the hay-crop, instead of forming a legitimate part of our national agricultural production, and going to swell the aggregate of its money-value, ought rather to be regarded as a tax imposed by the severity of the climate—a tax involving a vast amount of labor and time and money to which the farmer in our milder latitudes is not subjected. There may be some shadow of truth in this view of the case, and yet, like all other apparent hardships, it has its compensations, as the history of the various parts of our country abundantly demonstrates.

There is scarcely anything which a person who has become accustomed to the fine close carpet of green with which nature covers every hill-side and every landscape in our northern sections, would dispense with so reluctantly as the green turf of our natural grasses. But the greatest compensation to be found is the facility which the production of grass and hay gives for keeping up and increasing the fertility of our lands. The system of stall-feeding, for which the making of hay is designed to provide, is the only system by which a constantly improving mixed husbandry can be sustained; and the want of it may be assigned as the true cause of the exhaustion of the lands of Virginia under the constant culture of tobacco. The only substitute for it is the soiling system, and that becomes impracticable of general application in a country where pasturage and browsing are abundant and cheap.

The artificial production of hay is of comparatively modern origin, as I have shown; but within the last quarter of a century it has increased with great rapidity, especially since the introduction of the numerous labor-saving machines has put in our power to cut and cure our grasses so quickly and so cheaply. At the time of the first appearance of this prod-

uct in our national census of 1840, the yield of the entire country was but 10,250,000 tons, and it had increased in 1850 to only 13,838,642 tons. But in 1860 we cut and cured over 19,000,000 tons, while in 1870 the product was stated at 27,316,048 tons, an increase of more than 100 per cent. in twenty years. The money-value of this crop cannot, therefore, be less than \$300,000,000, to which is to be added at least an equal amount for the value of grass for summer pasturage, making an aggregate of over \$600,000,000 for the grass and hay crop of the country.

That the quality, and consequently the value, of the hay made now has vastly improved over that made a half-century ago, no one at all familiar with the subject can entertain a reasonable doubt. A great amount of thought and experiment has been directed to the best methods of production and of curing, while machinery has given us a greater control over the seasons, or rather has enabled us to avoid the exposure to the exigencies of the weather, to a vastly greater extent than was possible within the memory of men still living.

IMPROVEMENT OF STOCK.

Let us see now what effect this progress has had upon the number and quality of our cattle. There can be no doubt that the idea of the possibility of improving the common stock of the United States was first suggested by the great results obtained by the early improvers of stock in England. The present advanced position of the stock interest of this country can be traced directly to the practical labors of Bakewell, the Messrs. Cully, Colling, Bates and others, just as the first impetus which these distinguished breeders received can be traced to the efforts of such men as Lord Kames, "to improve agriculture by subjecting it to the test of rational principles," and Jethro Tull (1740), the inventor of the horse-hoe, the drill-husbandry, and many other bold and advanced notions. Tull launched out bravely into the field of experimental agriculture, and boldly threw open the door of improvement never again to be closed, and this new-born spirit of progress very soon appeared to spread; for it was only about ten years after him, or about 1750, when Bake-

well began those skilful experiments in breeding and with such marked success as to impress his influence upon the progress of agriculture all over the civilized world.

It was, of course, some years before Bakewell's magnificent results began to attract public notice, even in England, and their influence was much slower in reaching this country. It began to be felt here toward the close of the last century, or more properly, perhaps, directly after the close of the revolutionary war, for Mr. Goff and two other gentlemen of Maryland imported some very large animals from England, in 1783, which appear soon after to have gone into the hands of Matthew Patton of Virginia, who, about the year 1794, removed to Kentucky and carried the cattle with him. A part of the same stock was taken to Ohio in the year 1800 by John Patton, a son of Matthew. These cattle were well known in Kentucky and Ohio, where they soon gained a wide reputation.

There were a few other importations about that period, all of them in small lots, the most important of which were some cattle introduced into Maryland by a Mr. Miller, between 1790 and 1795, and a few Shorthorns into Westchester County, New York, in 1792 and 1796. These were probably the only importations made with any design of improving American cattle. Here and there a Jersey of that day, and possibly a very few individual animals of other breeds, brought over by ship-masters, are known to have been introduced and kept here, but they made no perceptible mark on our common cattle. Nor were there many or frequent importations until after the year 1820, though a herd of Devons, consisting of a bull and six heifers, presented to Robert Patterson of Baltimore, by Mr. Coke, afterwards Earl of Leicester, were imported in 1816; twelve head of Shorthorns arrived in Kentucky in 1817, and two more in 1818. It was in that year the celebrated bull Cœlebs, the founder of Colonel Jaques's "cream-pot breed," Fortunatus, owned by Gorham Parsons of Brighton, and Young Denton, owned by S. Williams of Northborough, were imported into Massachusetts, while Henry Clay introduced the Herefords into Kentucky in the year 1817, and Colonel Saunders's importation of Shorthorns arrived in that State the same year.

Of all these early importations made by public-spirited individuals, the Patton stock probably made the most mark. They did much to teach people the possibility of improvement. They were the pioneers, and, together with subsequent importations, not only infused their blood into the stock of that great Western country, but did something to excite a spirit of emulation among the farmers there, and this may be said to have laid the foundation for the splendid results which Kentucky, Ohio and adjoining States have since realized.

FREQUENT IMPORTATIONS.

After 1820, that is within the last half century, importations became more frequent. But though from time to time all the prominent breeds, the Shorthorns, the Herefords, the Devons, the Ayrshires, and the Jerseys, were introduced on trial, and, to some extent, crossed with our common cattle, the interest in stock was confined chiefly to individuals. The mass of farmers were slow to make changes, especially among the smaller farmers at the East. We may discover the first evidences of some general interest at the West about the year 1834, when the Ohio company for importing English cattle gave a great impetus to the spirit of improvement by large importations of Shorthorns, and from that date the progress in cattle-husbandry became very rapid, and we see the magnificent results of it at the present day.* Early maturity

* The results of these frequent importations and the enterprise they indicated and created in the improvement of stock, may be said to have culminated, so far as the Shorthorns are concerned, in the great sale of the New York Mill's herd on the tenth of September, 1873. Nothing like it has ever been known in the history of any herd of domestic animals in any part of the world. A hundred and eight head of cattle, old and young, brought \$380,890, or an average of over \$3,500. Eleven cows of the Duchess family of Shorthorns brought \$238,650, and a bull of the same family sold for \$12,000. Seven head of the Oxford family brought \$31,600. A heifer calf, five months old, a Duchess, brought \$27,000. The 1st Duchess of Oneida, three years old, brought \$30,600, to go to England. The 10th Duchess of Geneva brought \$35,000, also to go abroad. The 8th Duchess of Geneva sold for \$40,600. Four cows averaged over \$33,000 apiece.

The Duchess family of Shorthorns was established by Thomas Bates, a distinguished English breeder, in the early part of the present century. The herd of the celebrated Charles Colling was brought to the hammer in 1810, and Bates, who already had some of the Duchess blood, bought of Colling at private sale, here laid the foundation of what he called the Duchess family. "Comet," an uncommonly finely formed bull, brought at that sale a thousand guineas, the highest price that had ever been paid for such an animal. After breeding with great skill for many years,

and a tendency to fatten well are of transcendent importance to the Western farmer who breeds to supply the stalls in our Eastern markets, and he was quick to see how he could improve the intrinsic qualities of his stock in these respects.

In the Eastern portions of the country the dairy early became the leading object of pursuit. Size and fattening properties were of less account, and hence we find that modern importations for that section have consisted chiefly of the celebrated dairy breeds, of which the Ayrshires and the Jerseys have taken the lead, according to the special object proposed. These importations have been especially numerous within the last twenty years, till they have greatly modified the stock. In Massachusetts, for example, in 1853 there were less than seventy-five pure-bred Jerseys in the whole State. Now they number several thousands, and single herds now contain more pure and high-bred animals of this breed than could have been found in the State twenty years ago. And the same remark applies to the Ayrshires.

While the constant introduction of improved cattle from abroad has effected a very marked general improvement in the quality of our animals, the universal interest in cattle-husbandry has led to greater knowledge of stock, to better systems of feeding and management, and so to more satisfactory results. No longer ago than 1841, Mr. Colman, a well-known agriculturist, remarked that the general treatment of cows at that time, in New England, would not be an inapt subject of presentment by a grand jury. Now they are better sheltered, better fed, and more tenderly treated.

And while this progress in the improvement of the intrinsic

this celebrated herd was sold at auction in 1850, after the death of Mr. Bates. At this sale, Col. Morris of New York bought several of the Oxford family, also established by Bates, and forming a part of his herd, and numbers 5, 6, 10, and 13 came to New York, together with the famous bull "Romeo," bought of the Marquis of Exeter, in the same year. In 1853, again, Col. Morris and Mr. Becar bought at Earl Ducie's great sale, Duchess 66 and the Duke of Gloucester. In 1856, Col. Morris, then sole proprietor of these choice animals and their progeny, sold fifty head of them to Samuel Thorne of Westchester County, New York, who had also purchased at Earl Ducie's sale, in 1853, the cows Duchess 59, 64, and 68, and that most perfect of all his kind "Grand Duke," at over a thousand pounds sterling. In 1857, Mr. Thorne sold his whole herd to J. O. Sheldon of Geneva, N. Y., who, after breeding it ten years with great skill, in 1867 sold the herd to Wolcott & Campbell of New York Mills, near Utica, N. Y. Mr. Campbell became sole proprietor of the herd in 1872, to sell again in 1873, with the result stated above.

sic qualities of our stock has been going on, the number of neat-cattle in the country has largely increased. The aggregate number by the census of 1840 was 14,971,586; in 1850 it was 18,378,907; while by the census of 1870 we find 23,820,608. Of these there were about 9,000,000 cows. It will be seen that the amount invested in this class of live-stock alone cannot be less than \$300,000,000, the total value of the live-stock of the country being officially reported as \$1,525,276,457.

THE DAIRY INTEREST.

It would be interesting to study the form in which the product, or, in other words, the profit of the vast amount of capital invested in neat-stock appears in different parts of the country. Space will admit of only a brief allusion to this point, but it is evident that throughout the Northern and Middle States it will appear very largely in the form of dairy products, while in the West we shall find it more generally in the form of slaughtered animals. Among the dairy products we find by the last census that we sold 235,500,599 gallons of milk in its natural form. It went chiefly to supply our large towns and cities; the figures not representing the vast amount consumed at home, and thus contributing so much to the comforts and the necessities of life. At the same time we produced 514,092,683 pounds of butter and 53,492,153 pounds of cheese. These figures, large as they are, do not represent anything like the production of the country. The value of butter made in New York alone in the year 1865 exceeded \$60,000,000. It is probable that the cheese made in factories, now numbering something like fifteen hundred, was returned under some other head, and that the 53,000,000 is the amount supposed to have been made in private dairies, for we know that the quantity of cheese made in New York State in 1864 for sale, in addition to that consumed on the farm, was nearly 72,200,000 pounds, while the product there, as in all the other Northern States, has been rapidly progressing since that date, owing to the constant expansion of the factory system and the stimulus of high prices. It is quite within bounds to say that the butter product of the

country is fully 600,000,000 pounds, and that the cheese exceeds 200,000,000 pounds a year.

The dairy business of this country has developed with such rapidity and to such a degree of importance, with the aid of the highest intelligence and the application of the most consummate skill, as to be regarded as one of the highest triumphs of modern agriculture. Its annual product amounts to over \$400,000,000, and the capital invested in it does not fall short of \$700,000,000. It gives employment to a vast number of hands, and contributes to the comfort and the health and the wealth of all classes of the community.

THE PACKING BUSINESS.

Another product of the cattle-husbandry of the country, and a most important one, whether considered from a financial point of view merely, or as furnishing a vast amount of food for the sustenance of mankind, is represented in the value of animals slaughtered or sold for slaughter, and by the census of 1870 we find this item amounts to about \$400,000,000, or more accurately, \$398,956,376, a gain in ten years of very nearly \$200,000,000. This, of course, includes the pork-packing business, till recently confined, to a large extent, to certain Western cities, but now carried on as a growing business at many convenient points along our great lines of railway in other parts of the country.

Improvement in swine began less than three-quarters of a century ago. The first that excited any general interest was made by some animals sent from Woburn Abbey, by the Duke of Bedford, to General Washington. The Englishman intrusted with the care of delivering them seized an opportunity to sell them on their arrival in this country, but they were bred and became popular, and from all accounts they were splendid animals, small and fine in the bone, with a deep round barrel, short in the leg, feeding easily, and maturing early. They were long known as the Woburn breed, and in some sections as the Bedford hog, and were originated by a fortunate cross of the Chinese and the large English hog of that day. They would weigh from four to seven hundred pounds at a year old, with light offal and most excellent quality of flesh. They became very common in Maryland, Dela-

ware, and Virginia, and they were sent to Colonel Timothy Pickering of Massachusetts, and became well known in that part of the country. They are now extinct. The Byfield breed, so popular for many years, originated in the same way. China thus did a good thing for our agriculture fifty years ago and more.

Previous to the introduction and diffusion of the Woburn, the Byfield, the Mackay, and more recently the Suffolk, the Berkshire, the Essex, and other popular English breeds, the classes of swine that prevailed in the Eastern and Middle, and especially the Southern and Western States, were coarse, large-boned, long-legged, and unprofitable creatures, better calculated for sub-soilers than for the pork-barrel, though the grass-fed hog had done something to improve them as early as the time of the importation of merino sheep. But it soon became settled that neither the Eastern nor the Middle States could compete with the West in the production of pork upon a large scale, on account of the difference in the cost of grain. The raising and packing of pork has, therefore, grown up very naturally in the Western States, and vast quantities are exported from there every year. At the same time the facilities for carrying on this business have been so greatly multiplied that the whole packing trade has been reduced to a system so perfect that it may almost be said that no particle of the animal is now wasted, that all is economized, either for food or in the form of some commercial product, as bristles, lard, grease, stearine, soap, Prussian blue, etc., the aggregate of which collateral industries is scarcely less important than the preparation of food itself. The business involves a vast amount of capital, gives labor to a vast number of men, and adds amazingly to the material prosperity of the country.

THE WOOL INTEREST.

Sheep husbandry in this country has been subject to great vicissitudes. Sheep were imported by the early settlers, by the Virginia colony, as early as 1609, and they increased by 1648 to three thousand. The Dutch West India Company introduced them about the year 1625, but they proved to be too much of a temptation for dogs and wolves, for it is recorded that in 1643 there were but sixteen in that whole col-

ony. They were kept upon the islands in Boston harbor as early as 1633, and two years after there were ninety-two in the vicinity of Portsmouth, New Hampshire. It became the universal practice in the days of homespun for a farmer to keep a number sufficient to clothe his family.

The old "native" sheep was a coarse, long-legged, and unprofitable animal, and there was no improvement made in the breeding till towards the close of the last century, when, in 1793, the first merinos, or fine-woolled sheep, were imported by William Foster of Boston. They were wholly unappreciated, were given to a gentleman to keep, and he, knowing nothing of their value, "simply ate them," and a few years after was buying the same class of sheep at \$1,000 per head. The embargo of 1808 induced many to turn their attention to fine-wool sheep, and soon after very large numbers of merino sheep were imported and distributed throughout the United States, and our modern sheep-husbandry, now grown up to its proportional importance, may be said to date from these importations.

The condition of the country gradually changed, and since the opening of lines of communication to the West, the Eastern States have found it hard to compete in the raising of fine wool with farmers who could furnish us with the raw material for our manufactories at a cost of a cent a pound or less for transportation. The growing of sheep for mutton and for wool has, therefore, been left to a great extent to the Western States and to Texas. We find, accordingly, that of the 28,477,951 reported by the last census, Ohio had about 5,000,000, California 2,768,187, Michigan nearly 2,000,000, and Indiana, Illinois, Missouri and Wisconsin over a million each. The quantity of wool raised exceeded a hundred million of pounds, more than a fifth part of which was raised in Ohio. This was a gain of over forty-seven and a half million pounds over the product of 1850, and of very nearly forty million over that of 1860.

It will thus be seen that the production of wool constitutes no inconsiderable part of our agricultural industry, and that, in this respect, we have made a highly commendable degree of progress. This production, though little enough when compared with what it ought to be in a country so extensive

and populous as ours, is still sufficient to place us in the front rank as compared with other wool-producing countries. And while the quantity has increased, the quality has been greatly improved since the modern interest in breeding began. At the World's Fair in London, in 1851, the fleece that commanded the highest prize for the fineness and beauty of staple, in a free competition with Spain, Saxony, Silesia, and other parts of Germany, was grown on the green pastures of Tennessee, while at the International Exhibition at Hamburg, in 1863, the Vermont merinos carried off the prizes.

AMERICAN HORSES.

Whether the horse in general has actually undergone any improvement or not may admit of some question, but it is certain that the horses of this country have been greatly improved within the present century. The chief means of carrying on our early inland commerce, including a large amount of heavy teaming and transportation, was the horse. The public roads were bad, worse even than they are at the present day, and over these the freight of the country, whatever it was, had to be moved in wagons made to be capable of the hardest usage. The modern light carriage would have been comparatively useless in a new country and over such roads, while a speed now seen every day would have been quite unsafe. The mail contracts, even over a very large part of the country, when the post system was instituted, were based on a speed below four and five miles per hour. But there were no mails previous to 1790; and in 1791, the first year of the mail service, there were but eighty-nine post-offices in the whole country, and less than two thousand miles of post-roads, and on these nine-tenths of the mail-service was done on horseback, the stage service being very small.

A few stage routes had been established at an earlier date. The first, and at that time the only, stage wagon in America is said to have left Boston for Portsmouth in 1661. There were then but six stage coaches in all England. The first line of stages between Boston and New York was started in 1732, a coach leaving each city once a month, and fourteen days being required to complete the journey. A regular stage line between Boston and Gloucester, Mass., was established in 1788,

and consisted of one open two-horse wagon running twice a week. Besides this there were only four stages which ran into Boston at that time.

It will thus be seen that the social conditions of the last century were not favorable to the improvement of the horse, certainly not to increase his speed, now considered indispensable. Fast trotting was scarcely known at the time of the old "Justin Morgan," foaled in 1793, nor was speed estimated as of special money-value till the invention of the modern light buggy and the improvement of roads; but this quality has now come to be essential to the comfort and convenience of all classes of people. In this respect there can be no question that a great increase has been attained by careful breeding, especially within the last thirty years, while much greater attention has been paid to style, action, temper, form, constitution and endurance, so that the aggregate money-value of our horses has been enhanced by the higher general average of intrinsic good qualities.

MORGANS AND BLACKHAWKS.

These improvements are largely due, no doubt, to the frequent importation and infusion of thoroughbred blood into our stock. In some sections of the country, at the South and the Southwest, they may be said to be almost wholly due to this source. But in the New England States, and to no small extent in the Middle and Western States, they are due to the influence of two great classes of horses, both very celebrated roadsters, known as the Morgans and the Blackhawks, the former deriving their origin from the old "Justin Morgan," remarkable for compactness of form, strength and docility, and unsurpassed for general utility; the latter excellent as roadsters, of a high and nervous style of action, wonderfully elastic step, and a symmetrical and muscular form. These two families of horses have added many millions of dollars to the value of the stock of this country. They infused a new spirit into the whole business of horse-breeding, and gave us such a reputation for great success in this direction as to lead Professor Low, of Scotland, in his "History of Domestic Animals," to say of us: "They prefer the trot to the paces more admired in the old continent, and having directed atten-

tion to the conformation which consists with this character, the fastest trotting-horses in the world are to be found in the United States."

But the draught-horse has not been neglected. The Conestoga, a large and heavy breed of horses, used mostly for the purposes of slow work in the drays of our large towns and cities, is extensively raised in some parts of the Middle States, while the Percheron has more recently been introduced and bred in some parts of the West.

The number of horses in this country, according to the last census, was 8,690,219, of which 7,142,849 were on farms, and the balance found in cities and large towns. This was a gain of more than a million in ten years, for, in 1860, the total number was reported as 7,434,688, of which 6,249,174 were upon farms. The number on farms in 1850 was 4,336,719, there having been no effort made to ascertain the number not kept on farms.

It will thus be seen that the capital invested in horses constitutes a large item in our national wealth; and to this should be added more than a million of mules and asses, the number returned in the census of 1870 being 1,125,415. The extent of our dependence upon this class of stock was never more completely realized than during the prevalence of the epizootic of last year, when the infinitely varied transactions of the country, social, manufacturing and commercial, were so nearly brought to a stand-still for the want of the services of the horse.

LIGHT OF INTELLIGENCE.

This brief sketch of the rise and growth of the great agricultural interests of the country, involving such vast amounts of capital, giving employment and bread to myriads of men, and producing annually the incredible income of more than \$2,447,538,658, would be incomplete without an allusion to the increase of intelligence, and the part which science has taken in bringing about such magnificent results.

I have already referred to the early attempts at associated effort and the growth of agricultural societies. Few and feeble enough at first, and slow in the growth of their influence among the people, they have now become a powerful aid

in the progress of all departments of agricultural knowledge, and have grown up to a harmonious system of national, state, county and township organizations, all active, not only in gathering and diffusing information, but furnishing a constant stimulus to new effort and to higher triumphs of practical skill.

To the earnest spirit of inquiry which these societies awakened in the community is due, in a great measure, the growth and respectability of the agricultural literature of the country. With the exception of four brief "Essays on Field-Husbandry," by the Rev. Jared Eliot, of Connecticut, the first of which is dated in 1747, I know of no agricultural book, of any account, printed in the colonies previous to the Revolution; and all that followed that event for many years consisted chiefly of the more or less valuable papers submitted to the Massachusetts, the Philadelphia, and the New York societies, till the "American Farmer" was started in Baltimore in 1819. This is believed to have been the first regular strictly agricultural journal published in the United States. Others soon followed, however, till we have now about a hundred periodicals devoted to the various branches of farm economy, some of which are of a very high order of merit. The aggregate regular circulation of these journals cannot be less than three hundred thousand copies, and they indicate a wide-spread desire for information which must necessarily have an important influence on the future development of this great interest.

OUR AGRICULTURAL LITERATURE.

The permanent agricultural literature of the country, now so extensive and so creditable, has grown up, for the most part, within the last twenty years. A few books of a high character appeared, from time to time, forty or fifty years ago, among them Coxe on Fruit-Trees; Thacher's American Orchardist; Arator, by Colonel Taylor, of Virginia; Fessenden's Complete Farmer, Buel's Farmer's Companion, etc.; but a large proportion of the farmer's reading, previous to 1850, consisted of English works, many of which were reprinted in this country. Since that date American treatises, in the highest degree instructive and useful, have appeared, and we have works upon landscape-gardening, fruits, animals,

dairy-farming, drainage, and, in fact, upon subjects covering the whole range of farm economy, many of them of unexceptionable literary merit in point of style, finish and perfection, and the results of accurate scientific research.

To bring the facilities for improvement within the easy reach of the largest number of people, the system of township and district libraries was first initiated by the State of New York, in 1837, with an appropriation of \$200,000 a year for three years, and subsequent grants of \$50,000. This example was followed by Massachusetts in 1839, and more recently Michigan gave each township the sum of \$50 annually for this purpose. Indiana adopted the same policy in 1854, Ohio in 1857, the former appropriating \$300,000 a year for two years, the latter \$80,000 annually. Illinois and other Western States adopted a similar course, and it was properly regarded as admirably adapted to promote agricultural improvement, as well as the general welfare of the community. At the same time most of the states early adopted the plan of publishing and distributing large numbers of documents upon agriculture, gratuitously, among the people. These documents are, many of them, of high merit, containing the most recent scientific investigations, reports of experiments, and the observations of the most experienced practical men. Probably about two hundred thousand volumes are thus freely distributed through the farming community every year, with the addition of about as many more issued by the Department of Agriculture at Washington. These and various similar instrumentalities, all now in constant activity, are exerting a vast influence in developing our material resources.

WHAT SCIENCE HAS DONE.

The contributions of science to the progress of practical agriculture are by no means small or unimportant. Agricultural chemistry, itself in a state of transition and rapid growth, was never so helpful or so available to the farmer as at the present day. Though Sir Humphry Davy may be said to have opened the door to progress and improvement in this direction, in the early part of the present century, the accumulation of scientific facts was so slow that it was not till

1840 that Liebig announced propositions that opened a new world of thought and study, and awakened the attention of intelligent farmers to the importance of applying the results of chemical investigations, and, in some respects, essentially modified the practice of all civilized countries.

They were simple words to lead to such results:—"To manure an acre of land with forty pounds of bone-dust," said he, "is sufficient to supply three crops of wheat, clover, potatoes, turnips, etc., with phosphates; but the form in which they are restored to the soil does not appear to be a matter of indifference; for the more finely the bones are reduced to powder, and the more intimately they are mixed with the soil, the more easily they are assimilated. The most easy and practical mode of effecting their division is to pour over the bones, in the state of fine powder, half of their weight of sulphuric acid, diluted with three or four parts of water." Simple words, and yet they opened the way to the whole system of concentrated fertilizers, which has extended so far in modern times and grown to such gigantic proportions as to affect the commerce of the whole civilized world.

Guano, to be sure, had first been brought to public notice by Baron Humboldt and by Sir H. Davy, but it was not till the researches set on foot by the revelations of Liebig that it was at all used in England. Twenty casks were landed there in 1840, and so great was the confidence in its use, as a means of renovating the soil and increasing the products of the country, that the importation increased to 2,000 tons in 1841, and to over 200,000 in 1845, the English trade alone employing, in that year, 679 vessels. In less than sixteen years from 1840 the quantity taken from the Chincha Islands alone reached the enormous figure of 2,000,000 tons, and the amount of sales in that time was over \$100,000,000.

This precious fertilizer soon came to be extensively used in this country. In 1848, we imported over 1,000 tons; in 1849, over 21,000 tons; in the ten years previous to 1860 the quantity is reported at 842,787 tons. It is stated that in the ten years previous to 1870 the quantity imported was 387,585 tons, valued at about \$6,000,000. But these figures give but a feeble idea of the extent to which special and concentrated fertilizers now enter into our agriculture, for many

large superphosphate manufactories now exist in all parts of the country, while a great variety of other special fertilizers are made and offered for sale, some of them no doubt of great value, and others comparatively worthless.

COMMERCIAL FERTILIZERS.

In order to realize how immensely important these fertilizers have become in our modern agriculture, it is necessary to consider that the South is greatly dependent upon them, more dependent than the North, on account of the want of facilities for making and economizing farm-yard manures which the system of stall-feeding implies; but it is also fast getting to be recognized that they must come in as a necessary adjunct to farm-yard manures in high farming everywhere. And hence if the exact statistics could be known, and the extent to which they are used in all parts of the country, the figures would be truly astonishing.

The official inspector of fertilizers in Georgia, for example, estimates that the planters of that State alone pay over \$10,000,000 a year for fertilizers, while it is stated, by those in a position to know, that in four months, from December, 1869, to April, 1870, more than 300,000 tons of fertilizers passed through the city of Charleston, South Carolina; that over 100,000 tons passed over the Georgia Central Railway and other points in that State; that over 6,000 tons, valued at \$7,000,000, are manufactured at and sent from Chicago, on an average, every year. It is estimated that fully a half million dollars' worth are used in the State of New Hampshire every year. There are many single towns in Massachusetts that use from \$25,000 to \$45,000 worth, on an average, every year. There are several large fish-guano establishments in Maine, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Virginia, one of which is known to make over 7,000 tons a year. These, it is true, are but isolated facts, but they serve to mark the changes which science has already introduced into our practice. A thousand other facts might be mentioned to show what science has done to throw light upon the labors of the farm, and what progress has already been made in studying the composition of soils, of manures, of feeding substances, and of plants,

while investigation and experiment are still being pushed with such vigor as to promise far more profitable and tangible results in the future.

To this end the National Government has come to the aid of the States in the establishment of agricultural colleges where special attention may be given to the various sciences which bear directly or indirectly upon practical agriculture. All the States have now accepted the grant made by Congress in July, 1862, and, in more than half of them, such colleges have been established and are actually in operation, in some form or other. They will undoubtedly do a good work for the rising generation; but whatever results may flow from them, they seem to indicate that the present is but the dawn of a new era—an era of improvements of which we cannot yet form an adequate conception. They show that a greater application of mind to the labors of the hand is to distinguish the future over all past generations, for the large numbers of young men who will go forth every year from these institutions, many of them thoroughly instructed in chemistry and kindred sciences, will give us, at least, the conditions for new discoveries which will open the way to higher triumphs, and so lead on to the golden age of American agriculture.



